

WHAT IS CLAIMED:

1. An apparatus for fast, quantitative, non-contact topographic investigation of samples, comprising:

a light source;

a collimating concave mirror structured and arranged to produce a parallel beam and to direct the parallel beam to a sample to be investigated;

a structured mask located between said light source and said concave mirror; and

an image sensor structured and arranged to receive a beam reflected from the sample and said concave mirror; wherein relative positions of said mask and said sensor to other elements of the apparatus are chosen to provide an essentially sharp image of the mask on the sensor.

2. The apparatus in accordance with claim 1, wherein the samples comprise semiconductor wafers and other mirror-like surfaces.

3. The apparatus in accordance with claim 1, wherein said light source comprises substantially a point source.

4. The apparatus in accordance with claim 1, wherein said concave mirror comprises an off-axis parabolic mirror.

5. The apparatus in accordance with claim 1, wherein said structured mask comprises a quadratic grid.

6. The apparatus in accordance with claim 1, wherein said image sensor comprises a CCD image sensor.

7. The apparatus in accordance with claim 1, further comprising a converging lens positioned in front of said light source to be in a beam path.

8. The apparatus in accordance with claim 1, wherein said light source comprises a laser and a converging lens structured and arranged to provide a diverging beam.

9. The apparatus in accordance with claim 1, wherein said light source comprises a laser with a built-in converging lens that is structured to provide a diverging beam.

10. The apparatus in accordance with claim 1, further comprising one of a converging and a diverging lens positioned in front of said sensor to be in a beam path.

11. The apparatus in accordance with claim 1, wherein at least one flat mirror is positioned between said light source and said concave mirror to fold an optical path.

12. The apparatus in accordance with claim 11, wherein at least one of said at least one mirror comprises a partially transmitting mirror.

13. The apparatus in accordance with claim 11, wherein at least one of the at least one mirror is a semi-transparent mirror.

14. The apparatus in accordance with claim 1, wherein at least one flat mirror is positioned between the sample and said concave mirror to fold an optical path.

15. The apparatus in accordance with claim 14, wherein at least one of said at least one mirror comprises a partially transmitting mirror.

16. The apparatus in accordance with claim 14, wherein at least one of said at least one mirror comprises a semi-transparent mirror.

17. The apparatus in accordance with claim 1, wherein at least one flat mirror is positioned between said sensor and said concave mirror to fold an optical path.

18. The apparatus in accordance with claim 17, wherein at least one of said at least one mirror comprises a partially transmitting mirror.

19. The apparatus in accordance with claim 17, wherein at least one of said at least one mirror comprises a semi-transparent mirror.

20. The apparatus in accordance with claim 1, further comprising a computer coupled to said sensor, said computer comprising an algorithm to

calculate a height of a given point of the sample from a position of an image point on said sensor.

21. A process for fast, quantitative, non-contact topographic investigation of a sample in the apparatus in accordance with claim 1.

22. The process in accordance with claim 21, further comprising calculating the height of a given point of the sample from a position of an image point on the sensor.

23. A process for fast, quantitative, non-contact topographic investigation of samples, comprising:

directing light through a structured mask onto a concave mirror;

directing collimated light to a sample to be investigated; and

receiving a beam reflected from the sample and the concave mirror; and

positioning the mask and the sensor in relation to the mirror and the sample to provide an essentially sharp image of the mask on the sensor.

24. The process in accordance with claim 23, wherein the samples comprise semiconductor wafers and other mirror-like surfaces.

25. The process in accordance with claim 23, wherein a light source is arranged to produce light.

26. The process in accordance with claim 23, wherein the concave mirror comprises an off-axis parabolic mirror.

27. The process in accordance with claim 23, wherein the structured mask comprises a quadratic grid.

28. The process in accordance with claim 23, wherein the image sensor comprises a CCD image sensor.

29. The process in accordance with claim 23, further comprising converging the beam before the mask.

30. The process in accordance with claim 23, further comprising folding an optical path between the sample and the mirror.